



# Epi notes

Fall 2008

North Carolina Department of Health and Human Services | Division of Public Health | [www.epi.state.nc.us/epi](http://www.epi.state.nc.us/epi)

## The Role of the Epidemiology Section in Private Well Water Testing

### Background

In July 2006, the North Carolina General Assembly passed laws (House Bill 2873 and SB 2056) requiring all new private wells to be properly constructed, sampled, and permitted prior to use as a drinking water source. The statute also required that local health departments establish local ordinances to administratively carry out the new private well permitting program by July 2008. Details of this new statewide program were defined using the rulemaking process. These rules were finalized in February 2008 [15A NCAC 18A .3800 (Private Well Water Sampling) and 15A NCAC 02C .0300 (Permitting and Inspection of Drinking Water Wells)]. Several contaminants were specified for analysis and include the following: Total and Fecal Coliforms; pH; Nitrates/ Nitrite; Arsenic; Barium; Cadmium; Chromium; Copper; Fluoride; Lead; Iron; Magnesium; Manganese; Mercury; Selenium; Sodium; and Zinc. The intent of the legislation was to provide information to private well owners and to certain state agencies about the quality of drinking water from private wells. These parameters were chosen because of potential health effects that may occur when drinking water contaminated with significant levels over a long period of time. The U.S. Environmental Protection Agency (EPA) has established Maximum Contaminant Levels (MCL) for many of these contaminants in drinking water provided by public water systems.

### Role of the Public Health Laboratory

The North Carolina State Laboratory of Public Health (NCSLPH) performs testing for all parameters listed in the statute using a variety of EPA-approved methods. The Inorganic Laboratory performs analysis for all parameters except total and fecal coliforms. Bacterial analysis is performed by the Environmental Microbiology Laboratory, or sometimes at the local health department because of the requirement for samples to begin testing within a 30-hour time limit.



Well drilling equipment.

Laboratory results are provided to the submitter, usually a local health department, and to partner agencies with an interest in water quality. Results are reported based on EPA MCL. The program officially began statewide in July 2008, and the Inorganic Laboratory received and tested 230 samples from 38 counties in the first month. The Environmental Microbiology Laboratory received 178 samples from 39 counties. Data from the Environmental Microbiology Laboratory for the month of July is shown in Table 1.

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The high percentage of total coliforms present is primarily because sampling of newly constructed wells is a new requirement for many local health departments. Training of Environmental Health Specialists to perform proper sampling and shipping is an ongoing process, and proper sampling requires waiting for a full 24 hours following well treatment with disinfectant. Repeat sampling is requested when the MCL is exceeded, and if wells are repeatedly positive for total coliforms despite proper disinfection and sampling, this may be an indicator that the well was not properly constructed. The relatively high percentage of unsatisfactory samples can be due to a number of factors, the most common being that samples were received outside the required 30-hour holding time, and all required information was not included on the submission form.

## Role of Occupational and Environmental Epidemiology

Private well water sample results are provided to the Occupational and Environmental Epidemiology Branch (OEEB) for review by staff in the Medical Evaluation and Risk Assessment Unit (MERAU). An evaluation of the sample results leads to recommendations on the use of water, based on EPA MCL standards for public water supply systems. If the levels in the private well water sample exceed the EPA MCL, then OEEB will make recommendations such as not using the water for consumption (drinking and cooking). MERAU staff will also make recommendations on acquiring a safer alternate source of water and possibly re-sampling the well if the MCL is exceeded. For bacterial analyses, if total and/or fecal coliform bacteria are detected, OEEB will recommend that the water may not be safe for use. They will recommend that drinking, cooking, washing dishes, bathing and showering should not occur unless the water is boiled first for at least one minute.



Drilling a new well.

The sample evaluations are sent out to local health departments to be disseminated to well owners. Local health departments may consult with OEEB staff to answer any questions they may have concerning the drinking water evaluation and risk assessment.

**Table 1.** July 2008 Bacteriologic Results for New Private Wells, N=178

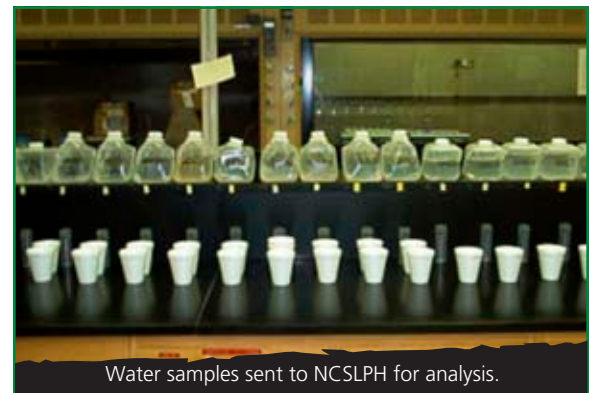
RESULT	Number	Percentage
Total Coliforms, Absent	85	47.8
Total Coliforms, Present E. coli Absent	62	34.8
Total Coliforms, Present E. coli Present	2	1.1
Unsatisfactory	29	16.3

*Submitted by:*

*Dr. Leslie A. Wolf, Laboratory Director, NCSLPH*

*Dr. Kenneth Rudo, Toxicologist, MERAU, OEEB*

*September 1, 2008*



Water samples sent to NCSLPH for analysis.



Instrumentation used to analyze private well water.

# Robert Hargrove

## North Carolina Public Health Award Recipient

Robert Hargrove, a Chemistry Technician III with the Office of the Chief Medical Examiner's toxicology laboratory, was honored with the Young Scientist Meeting Award (YSMA) at the Society of Forensic Toxicologists (SOFT) meeting in October. This



Robert Hargrove

competitive award recognizes bench-level scientists with less than five years of experience in the field of forensic toxicology. The YMSA is given to encourage training and research in areas related to forensic toxicology and to help offset travel expenses incurred for attending the annual SOFT meeting. Robert earned a BS in Chemistry from North Carolina State University in 2006 and has been with the toxicology laboratory since February 2007. Other honors include recognition as an American Chemical Society Scholar (2001-2006) and National Society of Collegiate Scholars (2001-2005). A brief summary of his research project is presented below.

Oxymorphone, recently reformulated in tablet format for oral use (Opana®, Endo Pharmaceuticals, Inc), is becoming more prevalent and is responsible for an increasing number of deaths. Oxymorphone evades detection unless screened with an immunoassay specifically targeted for oxycodone/oxymorphone or with a directed GC/MS assay. Concentrations of oxymorphone in postmortem fluids and tissue have not been previously published.

During toxicological examinations, postmortem blood is screened for the presence of oxymorphone with an ELISA assay targeted for oxycodone and oxymorphone

at a cutoff of 10 ng/mL. Presumptive positive specimens are confirmed utilizing a previously published GC/MS method for the simultaneous detection of codeine, morphine, 6-acetylmorphine, hydrocodone, hydromorphone, oxycodone, and oxymorphone. The method was revalidated, however, for oxymorphone to lower the limit of quantitation from 50 ng/mL to 25 ng/mL.

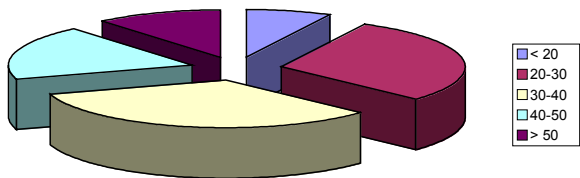
Prior to the introduction of the oxycodone/oxymorphone ELISA screen, or when a GC/MS directed assay was not performed for oxymorphone, cases in which the cause and manner of death were designated as 'undetermined' were re-examined for the presence of oxymorphone, retrospectively, when the samples were still available. In addition, cases in which oxymorphone was detected in the blood will be further analyzed to include testing of all available fluids and tissues for oxymorphone in order to establish its distribution in postmortem specimens and to learn about the corresponding concentrations. Review of the case histories allowed conclusions to be drawn regarding what constitutes a lethal concentration of oxymorphone in blood and the probable manner of death.

Since the advent of Opana® in June 2006, there has been an increase in the number of cases in which oxymorphone is present in North Carolina. Since 1995, 14 cases have been reported as of May 2008, of which 12 occurred since May 2007. The majority of the cases (78%) involved white males with a median age of 37.5 years (range 15-54). Almost 60 percent of the decedents had a history of drug abuse and at least two of the cases involved misuse of the medication by IV injection or insufflation of the drug. The median concentration of oxymorphone in postmortem blood is 0.14 mg/L (range <0.050 – 0.31 mg/L).

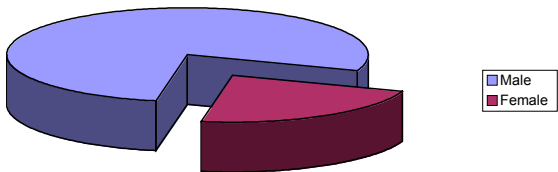
An increase in the prevalence of oxymorphone is apparent since the advent of Opana® and it is often abused by people with a known history of drug abuse. Oxymorphone must be specifically targeted during screening tests. Published data for oxymorphone concentrations in postmortem fluids and tissues is lacking, making interpretation of specimens with detectable concentrations of this analyte, in the absence of oxycodone, difficult. Oxymorphone is generally presumed to be lethal above 0.050 mg/L although dose, route of administration, and tolerance must be taken into consideration when making this determination.

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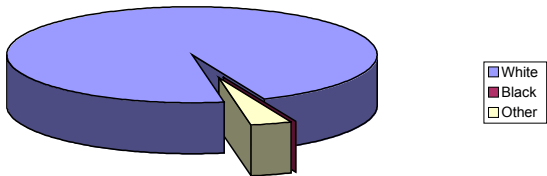
Oxymorphone by Age (years)



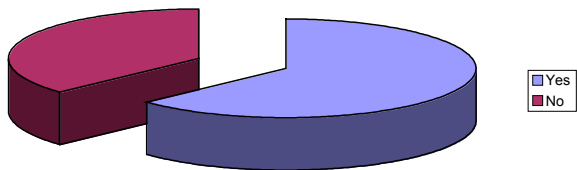
Oxymorphone by Sex



Oxymorphone by Race



Oxymorphone by Drug Abuse History



# Epidemiology Section Employee Recognition Fall 2008



Evelyn Foust, Marilyn Best and Dr. Jeffrey Engel

## *Marilyn Best*

Marilyn Best, a Ryan White program consultant, has worked in the AIDS Care Unit since January 2005. Before arriving at the AIDS Care Unit, Marilyn was the executive director for the Pitt County AIDS Service Organization (PICASO), working directly with people and families affected by the HIV/AIDS epidemic. Her extensive knowledge garnered while working for PICASO has dovetailed with the complexities of her current position and has proven to be an invaluable asset to our unit. In her current capacity, she provides programmatic and consultative functions for 16 Ryan White funded primary medical/dental and consortium projects in the eastern region of North Carolina. She has worked tirelessly and without interruption assisting RW Part B funded projects in her region to develop and implement their programs within established guidelines. Marilyn plays an active role in the AIDS Care Unit Advisory Committee, Ryan White Providers Meeting and other collaborative meetings by providing technical assistance and sharing her 18+ years knowledge of the HIV/AIDS epidemic and the Ryan White program. While providing excellent service to all of our Ryan White funded agencies, she is a source of inspiration for her peers and team player, and acts as a grounding force for the AIDS Care Unit.

## Reported Communicable Diseases, North Carolina, January-June 2008 (by date of report)\*

Disease	Year-to-Date (Second Quarter)			2ndQuarter 2008	Comments / Note
	2008	2007	Mean (2003-2007)		
Botulism, Infant	1	0	0	1	
Campylobacter	204	266	300	111	
Chlamydia, laboratory reports	9,676	14,624	15,354	5,583	
Creutzfeldt-Jakob Disease	1	3	1	1	
Cryptosporidiosis	12	39	31	3	
E. coli Shiga Toxin-producing	28	37	21	16	
Ehrlichiosis, Monocytic	5	16	10	0	
Foodborne, C. Perfringens	3	2	3	1	
Foodborne, Other	9	45	133	8	
Gonorrhea	3,150	7,044	7,577	1,948	
Haemophilus Influenzae	40	38	33	17	
Hepatitis A	26	20	34	17	
Hepatitis B	48	70	85	24	
Hepatitis B Carrier	287	448	463	125	
Hepatitis B Perinatal	1	1	1	1	
Hepatitis C, Acute	15	8	6	10	
HIV/AIDS	1,041	773	950	459	Note 1
Legionellosis	11	21	17	6	
Listeriosis	10	7	10	6	
Lyme Disease	2	19	25	0	
Malaria	11	12	11	9	
Meninccocal Invasive Disease	8	11	18	5	
Meningitis, Pneumococcal	15	31	23	10	
Mumps	5	24	8	4	
Rabies	241	250	290	134	
RMSF	23	182	165	12	
Salmonellosis	378	563	515	201	
Shigellosis	51	33	160	26	
Strep A	86	94	83	43	
Syphilis, Total	259	298	255	134	Note 2
Toxic Shock Synd.,Strep	3	6	4	2	
Tuberculosis	103	142	134	41	
Tularemia	2	0	0	2	
Typhoid, Acute	4	2	3	1	
Vibrio, Other	2	2	3	0	
VISA/VRSA (Staph aureus)	1	0	0	0	
Whooping Cough	76	170	86	37	

\*Preliminary data, as of September 2008. Quarters are defined as 13-week periods. Diseases reported in the first two quarters of 2008 define those listed in this table.

Notes: 1. Earliest report with HIV infection or AIDS diagnosis; 2. Includes primary, secondary and early latent syphilis.

## New Emerging Infectious Disease Fellows at NCSLPH

In September, the North Carolina State Laboratory of Public Health (NCSLPH) welcomed two new Emerging Infectious Diseases (EID) Laboratory Fellows. The EID fellowship program is co-sponsored by the National Center for Infectious Diseases, Centers for Disease Control and Prevention, and the Association of Public Health Laboratories. Each year, fellows are selected from a pool of applicants after surviving a rigorous evaluation process. Those selected are then matched with local, state or federal (CDC) public health laboratories based upon common interests.

Our one-year EID fellow, Amber Gates, received her BA from the University of Chicago and an MS in Biology from Louisiana State University. Amber will be mentored by public health scientist Dr. Julie Ann Kase and will be exploring North Carolina's high rates of Rocky Mountain spotted fever. In this state, Lone Star ticks have been found as carriers of *Rickettsia amblyommii*, a bacterium not previously linked to human illness. Serological and molecular (PCR) assays will be evaluated as a sensitive and specific means of differentiating spotted fever group rickettsia. Amber will be working extensively with Dr. William Nicholson of the Rickettsial Zoonoses Branch at the CDC to possibly implement these new assays at the NCSLPH.

Our two-year EID Postdoctoral fellow, Dr. Shanta Whitaker, holds a BS degree in Microbiology from Virginia University and recently completed requirements for her PhD from the Yale University School of Public Health. Dr. Whitaker will be mentored by public health scientist Dr. Shermalyn R. Greene. The primary focus of her research project is to develop a DNA sequence-based method that employs capillary gel electrophoresis for typing methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-intermediate/resistant *S. aureus* (VISA/ VRSA). The goal of this research is to provide critical information that can be used to determine intervention and prevention strategies for North Carolina's clinicians. In addition to developing a molecular typing assay, Dr. Whitaker will conduct a comparative analysis of data generated using a variety of molecular typing methods. The information obtained from this comparative study will assist in determining which methodology provides the most accurate means in typing these antimicrobial resistant bacteria.

## NC Electronic Disease Surveillance System (NCEDSS)

The NC Electronic Disease Surveillance System (NCEDSS) is a Public Health Information Network (PHIN) compliant secure web-based disease surveillance system designed to collect ALL communicable disease surveillance information. In addition to communicable disease reporting, a reporting system for childhood and adult lead surveillance is also nearing completion using the same platform. NCEDSS also includes an Outbreak Management module to facilitate outbreak investigations at either the local or state level. Development of the NCEDSS system started in January of 2006 and is in the final stages of implementation.

The initial implementation of NCEDSS was for TB surveillance. Currently, 23 counties are using NC EDSS for TB surveillance, monitoring directly observed therapy (DOT) and placement of skin tests (TST). An additional 11 counties are scheduled for implementation through October 2008 with the remaining counties coming online in late 2008 or early 2009. Implementation for TB surveillance was phased to bring high-TB morbidity counties online early and then add counties that have lower historical rates of TB.

The first pilot for general communicable disease and bacterial STD reporting was in March of 2008. At the end of September, 2008, 60 counties were using NC EDSS for CD and bacterial STD reporting (Figure 1). These counties account for approximately 70% of the communicable disease morbidity. At the time of initial implementation, data going back to 1992 for communicable diseases other than STDs were converted to NC EDSS record format. There are records for well over 100,000 disease events in the system as of now, representing reports for TB and all other reportable diseases except HIV/AIDS and syphilis. HIV/AIDS and syphilis surveillance activities will be added during the fourth quarters of 2008 and first quarter of 2009 in the Communicable Disease regional offices.

Continued rollout of communicable disease and bacterial STD reporting in local health departments will continue using an aggressive rollout through the remainder of 2008. At the point where all health departments have NC EDSS deployed, the use of the paper reporting instruments from the local health

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department to DPH ends. Information management and sharing will be more easily managed and accountability for reporting will be greatly improved.

Currently electronic laboratory report feeds come into NC EDSS from the NC State Laboratory of Public Health and from LabCorp. Other commercial laboratories as well as hospital laboratories will be approached and the ELR reporting mechanism for each individually tailored as deployment proceeds for additional ELR capacity. A recurring question is whether private providers will be able to report cases identified using NC EDSS. The current plans do not support this option; however, reporting from hospitals, prioritized to those with Public Health Epidemiologists is planned. The NC EDSS team will evaluate the possibility of eventually providing the capability for receipt of report data from the private sector.

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